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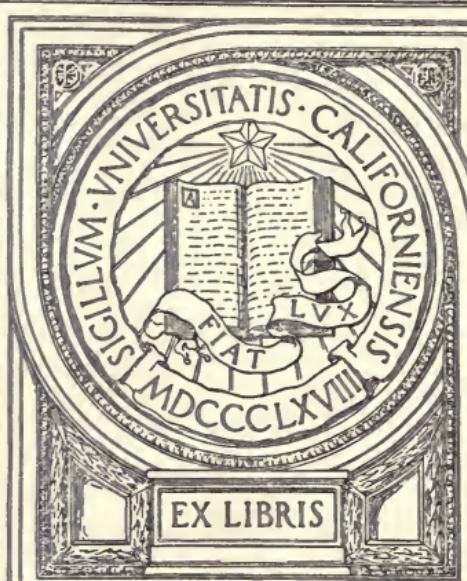
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Address Delivered ... on the  
Occasion of the Opening of the  
Sixteenth Industrial Exhibition  
... Mechanics' Institute of San  
Francisco, August 2d, 1881

By

William W. Morrow

UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES



Robert Ernest Cowan





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ADDRESS  
DELIVERED BY  
WM. W. MORROW,  
AT THE  
GRAND OPERA HOUSE,  
ON THE OCCASION OF THE  
OPENING OF THE SIXTEENTH INDUSTRIAL EXHIBITION  
HELD UNDER THE AUSPICES OF THE  
MECHANICS' INSTITUTE  
OF SAN FRANCISCO,

AUGUST 2D, 1881.



SAN FRANCISCO :  
EDWARD BOSQUI & CO., PRINTERS.  
1881.







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## ADDRESS.

*Mr. President, Ladies and Gentlemen:*

A distinguished English visitor, after six weeks of travel in the United States, recently arrived in San Francisco.

He was, of course, duly welcomed, and asked the usual question as to his opinion of the country and its institutions. His reply was a candid confession that he did not feel competent to pass judgment on the affairs of a country based upon observations made from the window of a railroad car.

The embarrassment of our English friend can be fully appreciated by any one who will attempt to gather and arrange statistics concerning our present progress in the mechanical arts and mechanical and agricultural productions. We are speeding along so rapidly through depressions and over altitudes, that broad fields of facts, on either side of us, drift away before we can note their character or determine even their location.

The careful and conscientious student desiring to determine accurately the value of these vast industrial fields, must stop and proceed patiently and systematically to investigate details, before he can render a judgment that shall comprehend all the elements that go to make up the material wealth and prosperity of a country.

Happily no profound discussion of any question in which you as friends of the Institute are interested, is called for on this occasion. I shall therefore content myself with a few obvious comparisons and illustrations to prove what everybody already knows, that we are in the midst of progress and that the future is full of promise.

### THE MECHANICS' INSTITUTE.

I learn from the reports of the officers of the Mechanics' Institute that it was founded on the 6th day of March, 1855, and that the first exhibition held under its auspices was inaugurated on the 7th day of September, 1857.

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In the announcement made by the Managers of the Institute some time previous to the first Exhibition, the influence of the proposed enterprise was expressed in strong and hopeful language. It was said: "The advantages of fairs must appear obvious to every reflecting mind; and in no quarter of this globe do they promise more than in California, where so much may be accomplished by the dissemination of correct information relative to her natural and artificial resources. Besides exciting emulation, extending practical knowledge, suggesting ideas to ingenious minds, affording tangible evidence of superiority, stimulating talent, exhibiting the progress of arts, promoting extensive intercourse among producers and their patrons, they cannot fail to excite a world-wide interest in regard to our State and extend reliable information respecting its resources, which will tend to encourage immigration and permanently establish beneath our genial skies an industrious, enlightened, prosperous and happy population."

It is pleasant now to note the sanguine expectations of the originators of these splendid Exhibitions and know that they have been more than realized. And the occasion of the opening of this, the Sixteenth Industrial Exhibition, seems a fitting opportunity to consider the progress that has been made in California, and particularly in San Francisco, in the last 24 years in those departments of industry with which this Institute is intimately connected.

#### PROGRESS OF THE STATE.

In 1857, the excitement caused by the discovery of rich placer mines nine years before in the lower ranges of the Sierras had about run its course with the exhaustion of the surface deposits.

The more restless of the adventurous miners had either departed for their Eastern homes or were searching for new El Dorados.

The Comstock was yet unknown.

It was a period when the future of the State seemed uncertain, but there were a large number of energetic and enterprising young men who determined not to abandon without further trial a country which in their eyes gave promise of a great future.

A few farmers scattered here and there over the State, had demonstrated that its broad sunny valleys were capable of producing large crops of grain of all kinds, while fruits and vegetables of every description grew in abundance.

During the year ending July 1, 1857, a larger crop of wheat, barley and oats had been grown than was necessary for home consumption, and a surplus of less than 40,000 bushels of wheat, 140,000 bushels of barley, and about 26,000 bushels of oats was exported. The wheat found a ready and profitable market abroad. The fact was suggestive, and gave encouragement that while the glory of our mineral wealth might suffer as the product decreased, there was wealth in the soil that would give the State a more enduring and a far brighter fame.

An agricultural community meant an abiding and industrious population requiring manufactures to supply its various and constantly increasing wants. This was the theme of the first industrial exhibition held in San Francisco.

#### THE HARVESTS OF GRAIN.

What has the harvest been? The wheat and flour exports from California since then have reached the enormous figures of one hundred and thirty millions of centals, or the equivalent of more than two hundred and sixteen millions of bushels. The export of wheat last year alone, amounted to more than fifteen millions of centals or twenty-five millions of bushels, while the total production probably exceeded thirty millions of centals or fifty millions of bushels.

The barley crop for 1880, has been estimated to exceed 5,000,000 of centals; the wool crop at 46,000,000 of pounds, and the wine product at 12,000,000 gallons.

It would weary you to go through the whole list of productions, but enough has been stated to show how generously the soil and climate have responded to the predictions made twenty-four years ago.

Now what has the patient, hard-working mechanic been doing all these years. There are no statistics at hand showing the extent of the manufactures in San Francisco in 1857, for this kind of industry was then in its infancy. The Assessor of this city and county reports that the total value of manufactures in San Francisco during the year 1880 was \$72,364,680, and that the number of men, women and boys employed was 28,232. This is an increase over the year previous of \$2,869,800 in the value of articles manufactured, and 2,671 in the number of men, women and boys employed.

Is it any wonder that the Pavilion used for the first Exhibition covering less than half an acre and giving floor space of only 20,000 square feet, has given place to the present immense structure covering more than four acres of ground and furnishing floor space of 190,700 square feet? We are not surprised either when we are told that the present building must give way to still another and that before the time comes round for the next Exhibition, a permanent building is to be erected of such grand proportions and architecture as to be at once the pride of the city and the glory of the State.

All honor to the public-spirited gentlemen who founded the Mechanics' Institute. All honor to their successors who have supported and carried it forward to the important position it now occupies, as a substantial power in developing the mechanical industries of the city and State.

#### THE MASTER OF LIFE.

"Mind acting through the useful arts," says Mr. Everett, "is the vital principle of modern civilized society."

"The mechanician, not the magician, is now the master of life. He kindles the fires of his steam engine, and the rivers, the lakes, the ocean, are covered with flying vessels; mighty chain-pumps descend, clanking and groaning, to the deepest abysses of the coal mines, and rid them of their deluge of waters: and spindles and looms ply their task as if instinct with life. It is the necromancy of the creative mechanist." This was said forty-four years ago, and it makes one curious to know what graceful thought would have been suggested to the eloquent orator by the wonderful machinery that now lifts the water from the profound depths of the Comstock lode. How much more, too, would he have been impressed with the great and all-pervading power of mechanic arts as they have since been developed in all departments of industry?

If we examine the discoveries of the past centuries and compare them with the inventions of our own times, we feel a pride in pointing out where the genius of man has triumphed here and there in solving some great mechanical difficulty, and we are often surprised, when the problem is solved, to find it had not been done before.

The expansive power of steam was known long before Watt put it into the form that has developed into the modern steam engine.

The electric current was known and recognized by the ancients, but who among them ever dreamed of applying it to the uses of to-day—the telegraph, the telephone, the phonograph, or the commercial light?

The principles involved in the power and pressure of water have been more or less understood and utilized for centuries, but it was the modern inventor that adapted those principles to the hydraulic lift, the hydrostatic engine, and the hydraulic nozzle.

And so with innumerable things, in innumerable ways, genius, necessity and opportunity separately and jointly have supplied, improved and invented.

#### INVENTIVE GENIUS IN CALIFORNIA.

In points of mechanical invention and adaptation, California has no need to feel ashamed of her record, and when we consider that the predominating influences here have not been favorable to deep thought and careful study, except as exigencies have arisen which momentarily commanded concentration of mind, the many evidences of genius among our mechanics and thinking men invoke admiration and satisfaction.

In some of the modern inventions California, perhaps, furnishes some of the best examples that can be found of improvements in the use and economy of forces. This is entirely natural and reasonable, when we remember that our population was not the result of growth upon the soil. We were all Topsy's—"Never was born; never had no father, nor mother, nor nothin'. I was raised by a speculator, with lots of others." Our raising seems to have shaped our character. Nature appeared to us strangely accoutered, and to subdue it quickly and effectively, we have sought for the best weapons we could find.

A friendly critic said of us a few years ago, that we appeared like a brand-new people with a brand-new country. He saw no evidences of a former generation. No old people, no ancient places, no antique things, no relics. It was as though in the school of events it had been determined to try the experiment of placing a perfectly clean slate (not a political one) in the hands of a new generation of men, and requiring them, without rule, direction or copy to work out the sum of all their capacities. With such a people there was no prejudice against new appliances.

The farmer commenced work without old tools, and of course he was anxious to get the best of the new. The miner was obliged to invent new machinery to enable him to search for the hidden treasure, or he must abandon the pursuit. The prize was a glittering one, and he began to think. When a full-grown man, accustomed to toil and struggle, is urged by a powerful incentive to think, he generally goes direct to the point. He may grasp his subject awkwardly, and even fail to comprehend it; but the chances are that he will break through some mystery by force and reach a truth, the road to which will afterward be explained by the scholar on strictly scientific principles.

#### THE MINERS—ORIGIN OF HYDRAULIC MINING.

The California miners have done wonders in increasing the power of man's agencies in the search for the precious metals.

In 1852 it occurred to a Placer county miner that the pressure of water might be used in working a gravel claim. He accordingly placed a barrel in some convenient place high above the ground he desired to work. Into the barrel he led a small stream of water and made a reservoir. From the barrel to his claim he stretched a hose made of common rawhide, and ending in a four-foot tin tube, the nozzle of which was one inch in diameter. This cheap and simple contrivance proved to be equal to the labor of several men in removing the earth and washing out the gold, and was the origin of what is now known all over the world as hydraulic mining.

The need of a large quantity of water under heavy pressure for this kind of mining has required its conveyance for long distances around mountains and across deep gorges. Here the inventive genius of the miner has enabled him to overcome difficulties which at first seemed insurmountable. The old heavy metal pipe could not well be secured and supported at a great height; but by successive improvements a thin sheet-iron pipe takes its place, and may now be seen suspended across gorges nearly 2,000 feet in depth.

At the mine where the water is used it is now discharged from an ingeniously contrived nozzle, under a pressure that makes the stream as rigid as a bar of steel. It plays with huge boulders as a child would play with marbles, and yet it is as easily controlled as the water faucet in your chamber basin.

What a marvel of power and convenience has been developed since the first experiment in 1852! But here I am assailed by a dis-

tressing doubt. Has all this power and mechanism been entirely beneficial? I fear that it has not. The miner has been expeditious and successful in scouring the hills for gold, but what has become of the mountains of earth he has washed down? This is dangerous ground. It has been said that rivers have been filled up and large tracts of agricultural land destroyed by it. It is said also that under the aggressive name of *debris* it has found its way into the halls of legislation and produced fearful havoc in the political and financial affairs of the State.

If all this is true, we must find either an engineer or politician—if he has not been found already—who will have the genius to follow up the inventions and improvements in this branch of industry, with some new and effective device that will make the hydraulic miner an unqualified blessing or abolish him altogether.

#### THE QUARTZ MINER.

The quartz miner has also done much in improving the methods and machinery long used for extracting and crushing ores.

For three or four hundred years the ponderous looking stamps used in the quartz mills of mining countries and brought here when quartz mining first commenced, were bobbing up and down in a most ridiculously ineffective manner. The stamp used was square and had a square wooden shaft, and the whole was lifted by a cam (usually also of wood), working in a long cut in the square stamp-head. Some bright fellow in the mountains, having no reverence for this aged contrivance, gave it new youth and vigor by substituting iron for wood and a cylindrical shaft and stamp-head for the square apparatus.

He thus simplified the construction of the several parts of the stamp, and then by giving it a rotary motion, made the shoes which crush the rock wear uniformly, and that is your quartz mill of to-day.

This was an exceedingly simple but valuable improvement, and the great wonder is that it was not made before.

As early as 1854, the hydraulic jack was employed by an ingenious mechanic in this city for raising massive buildings. Since then the same method has been used in Chicago and other large cities for a like purpose.

A small stream of water conducted through small pipes to numerous hydraulic jacks has quickly, steadily and silently done the work,

which would otherwise have required the employment of a large force of men in a slow and dangerous operation.

#### THE FEATURE OF THE DAY.

The feature of the day, and that which strikes an observer most forcibly, is the application of well-known scientific principles in simple, easy ways for the performance of work about the foundry, the machine shop, the mill or the factory. Turn where you will, and you will find some simple device which solves a problem, the solution of which has cost hours of thought and patient application. So simple and obvious are many of these modern scientific improvements to machinery, that one can but wonder at the delay in applying in practice a knowledge of principles which have been understood so long. Only the other day I saw in an engine-room of one of the large mills of this city, a contrivance which was represented to be simple, and it so appeared.

It was certainly very useful, and the explanation I had of it was so interesting, I determined to make a note of its operation.

Within a huge steam cylinder, under a pressure of from 80 to 100 pounds to the square inch, a piston traverses from end to end, according to the speed of the engine, perhaps fifty, sixty or seventy times every minute. Each square inch of the circumference of the piston bears closely enough upon the interior surface of the cylinder during its rapid movements to prevent the passage of the subtle steam even under the tremendous pressure which is required to furnish the power for all the motion in this large establishment.

To maintain this great speed with economy of power and safety the constant and regular introduction of some lubricant is necessary, but the place in which it is required seems inaccessible.

The problem of how to do this in the most satisfactory manner was solved by a San Francisco mechanic, and the whole principle involved was the simple one of specific gravity.

#### THE OIL IN THE GLASS TUBE.

The whole world has always known that oil was lighter than water, but it was only recently that this knowledge was made use of to introduce oil into a cylinder against a pressure of 100 pounds to the square inch.

Do you ask how it was done ?

The inventive mechanic tapped the feed-pipe of the cylinder and led a small pipe from this point by a circuit of a few feet to a point in the same feed-pipe nearer the cylinder. Midway in this second pipe he interposed an oil cup. The oil, subject to a pressure each way equal to the cylinder pressure, be it what it may, is in a state of equilibrium. But the effect of conducting the steam to the cup in the small pipe is to give it an extra exposure to the air and produce a slight condensation of steam into water. Each drop of water as it trickles from the pipe and settles into the oil cup, displaces a drop of oil, which immediately rises and is carried through the circuit and into the cylinder with the steam where it performs its intended office. So simple, so perfect, so successful and economical was this devise that it did not seem capable of improvement. And yet some bright ingenious mechanic saw that the thing was not complete; that in the hands of a shiftless man even this device might be used wastefully. To him occurred the idea that a glass tube filled with water might be interposed, forming a part of the return pipe, from the cup to the cylinder, and thus each drop of oil as it proceeds on its errand might be compelled to reveal itself to the engineer.

Need I say that it was exceedingly interesting to stand by that cylinder, feel its mighty throb, realize the enormous power it exerted, and observe through the simple glass tube just described the drops of oil hastening on with accuracy and dispatch to perform their appointed duty.

#### CABLE ROADS IN SAN FRANCISCO.

In this city, under our very eyes, we have seen a revolution created in the system of street railroads, and, while to the public of San Francisco the transition has been gradual and familiar, the invention is of such a character as to deserve here special mention, because the inventor was for many years the President of this noble and enterprising society, and the invention itself is another example of what Californians are doing for the world.

For many years horse-flesh has been the principal motive power used in carrying people to and fro in cities and towns. And as the democratic omnibus succeeded the more aristocratic cab, it in time became supplanted by the less noisy, more convenient and less costly street car, but they all had to be drawn by horses, and as these modes

of conveyance multiplied, as they naturally did from their convenient and cheap mode of transit, more horses were used and a larger number killed by overwork, especially on streets where the ascent was steep, or where the number of passengers carried was very great.

Steam motors, compressed air, latent steam and other plans had been tried without success, and methods that could be operated on country roads were not permitted to be used in cities and towns.

Large corporations were formed for carrying on street railroad traffic, and possessing thousands of horses, immense stables for their care and maintenance were required.

In such cities as Philadelphia, where streets are almost level and laid out at right angles, the city railroad companies have a car line on every street, and make large profits on their passengers at the rate of fare charged.

But in many cities like San Francisco, where the streets run up and over steep hills, the service to the public was poor, the remuneration to the Company was not great, while the comfort and care of the poor horses were certainly as bad as could possibly be.

The higher hills of the city were uninviting, except to the enthusiastic climber who had just arrived, and wanted to get a bird's-eye view of the State.

At the north end of the city, the cars of the Omnibus Railroad Company were drawn up Jackson street from Kearny to Stockton, a distance of 875 feet, by five horses, the elevation in that distance being 73 feet.

In the winter evenings, when the cars were crowded, the struggle of those unfortunate horses up the steep hill was something terrible.

It was on such an occasion, in the winter of 1869, that A. S. Hallidie was watching the efforts of the horses to draw up an overcrowded car, when one of the animals slipped on the wet cobbles and fell, throwing down the horse behind him. The brakes were immediately put on, and the horses urged to regain their footing, but the brakes being insufficient to hold the car on the steep incline, it slid backward, dragging the horses down the hill to the crossing below.

To this incident we are indebted for the cable road of to-day and all its attendant comforts.

## A. S. HALLIDIE'S PLANS MATURED.

Within two years Mr. Hallidie had matured his plans for a road, but like all such inventions and enterprises, it did not at first meet with much encouragement, and but for the assistance and co-operation of two or three gentlemen, who saw in it more than the mere fancy of an inventive mind, it would have slumbered where it was born.

In September, 1873, the first railroad of the kind ever built was constructed on Clay street in this city, and, while a great many difficulties and obstacles had been overcome, and notwithstanding it surprised the majority of the people by the simplicity of its working, it yet failed for some time to convince the skeptical of its ultimate success, but as it continued to run month after month under the care and guidance of its master, it gradually won the confidence and admiration of the entire public.

The simple principles involved and their ingenious adaptation mark the value of the invention and the success of the undertaking.

And what a revolution it has made in the mode of transporting passengers in this city!

The hills have fallen down before it, and they are now even more accessible and certainly more desirable for residence than the level portions of the city.

Where the goats used to frolic on California street hill, mighty railroad kings have built their palaces. The bald old hill has taken on all the bewitching charms of a young girl with a bright, new poke bonnet, while Clay street and Russian hills, decked out in new finery, flirt with those brown old hills across the Gate in Marin county.

## SUMMIT OF CLAY STREET HILL.

The summit of Clay street hill, reached by the cable road, is 307 feet above the starting point at Kearny street, and the time required to make the transit is six minutes, by cars that depart every five minutes, ascending the steep incline as noiselessly and as lightly as a bird in flight. The feelings of personal discomfort, of commiseration for the tired and straining horses are entirely absent, and the weary passenger returning home enjoys a rest of body and soul.

Property on these hills, which before the advent of these roads could be purchased at almost any price, now commands high figures and is being rapidly built upon and improved.

It is eight years ago yesterday since the first experimental trip was made on the Clay street road, which at that time was 2,880 feet long.

Since then the road has been extended to double that length. Four other roads have been built, and another is now in course of construction. On the five roads now in operation steam machinery is employed of the aggregate of 1,300 horse-power, keeping in motion for 18 hours each day 17 miles of steel wire rope, containing 2,350 miles of wire and transporting 40,000 passengers daily.

Under the old system, one horse would draw, on a nearly level road, an average of forty passengers daily; but ten thousand horses could not perform the work of our present cable roads. Another item is the expense. On the Clay street cable road 36 pounds of coal will draw 40 passengers; or, in other words, 9-10 of a pound of coal, costing 3-10 of one cent, represents the cost of fuel in drawing one passenger.

While the underground railroad is the peculiar feature of London, and the elevated railroad is in like manner the feature of New York, San Francisco takes special pride in her cable roads, in which there has been already invested a capital of one and one-fourth millions of dollars.

The enterprising city of Chicago, that never does things by halves, is building a series of cable roads which will cost over two millions of dollars.

Thus it will appear that while the design of the inventor was more particularly to overcome the difficulties of steep grades, it will prove there, as it has here, admirably adapted to level streets, and the result will probably be that the principal cities of the Union will be compelled to adopt the system on account of its economy, noiselessness, rapidity and general comfort.

I might go on and multiply illustrations of the inventive genius of our people, but time does not permit of extending the inquiry further on this occasion. Let me, however, recommend you to visit the Mechanics' Pavilion, and there, among the thousands of articles exhibited, showing the latest productions of the farm, the machine shop, the factory and studio, you will find improvements and inventions both novel and curious, to excite your study and admiration.

## OUR MATERIAL RESOURCES.

If it now appears that we have an abundance of mechanical genius in this State, the next question of interest is, Have we the material in the soil on which to found a large and comprehensive industry? Has nature provided large sources of water-power, and stored up heat in forests of timber and fields of coal? The question is answered in a word.

The water-power of the western slope of the Sierras has been estimated to exceed that of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Delaware.

This tremendous force is now employed in only a limited way by the hydraulic miner, while in the winter season it spends itself extravagantly in flooding the valleys below.

The time will soon come when the hundreds of miles of ditches, canals and flumes that now line the mountain sides for mining purposes will be utilized, and their capacity increased to supply power for manufactories.

## FORESTS AND COAL FIELDS.

The immense forests of timber found in the Coast Range and Sierras should be a source of untold and lasting wealth to the State in supplying lumber for building purposes, material for all kinds of wood-work, and fuel for mills and factories, but, unfortunately, the lumber man, although enterprising and liberal, is plying an exceedingly wasteful trade. He plants his greedy saw-mill in the forest beside the river, and immediately enters into a conspiracy with steel and water to carry on a work of destruction. The splendid groves that nature required a thousand years to rear in their sublime grandeur, are prostrated in a few days. The choice portions of these great trees are soon converted into lumber, but the remainder is too often burned or allowed to rot upon the ground.

There should be more economy exercised in supplying our present wants from these ancient woods, for the time may come when every stick of wood a foot long will have a commercial value.

The present very able and energetic President of this Society can tell you more about the coal fields of this State and coast than I can,

and I have no doubt, but that I would express his knowledge on the subject in a business-like way, by saying that they are well-nigh inexhaustible.

It is proper to say, however, that it was at one time supposed that the lack of large deposits of good coal was one of the few things wanting to found in this State a great mechanical industry.

The discovery of tertiary coal fields—a more recent formation than the anthracite or bituminous coal—and sometimes improperly called lignite, was considered as an indication that the older and better series would not be found on this coast. I remember the charming excuse that was made some years ago that nature had been so busy making gold and silver she had not had time to complete her manufacture of coal, and we had surprised her in the act. This is proven to be only partially true, for the quality of our coal improves with each new discovery, until now, for smith purposes as well as for fuel, our home product promises soon to supply all our home demands.

Prospectors also report discoveries of coal of a quality that will yield excellent coke and hard coal suitable for the forge. The consumer is thus assured that all his wants in this respect will soon be fully supplied in both quantity and quality by home production.

#### THE FIRST IRON MADE IN CALIFORNIA.

At this point the pleasant duty devolves upon me to make the announcement of an event of more importance to the people of this coast than the result of an election or the birth of a prince. And yet it is indeed the birth of a king that I am called upon to proclaim to you. A king wielding an influence more potent than gold and bearing in his hands the sceptre of an absolute power.

In order that the advent of this new dynasty may be properly recorded in the annals of the State, let us notice with some particularity that at 4 o'clock on Sunday morning, April 24, 1881, the first iron ever made in California was run from the furnace. The event took place in Placer county, and the locality is named Hotaling, in honor of the well-known San Francisco merchant, who, with Irving M. Scott (a former President of this Institute), and Egbert Judson were the founders of this enterprise.

The establishment is under the Superintendence of James M. White. It produces 25 tons of pig iron per day, and as it has now

been in operation just 100 days its production has been 2,500 tons. As the supply of ore, fuel and other materials required is practically inexhaustible, the manufacture of pig iron may now be considered a permanent business in this State. The King has been duly installed. Long live the King! But you may ask why is this an exceptionally important event in California? The question is easily answered. It is because iron enters so largely and generally into the Mechanic Arts that they can scarcely be said to exist without it. And the lessons of all the years since 1849 have been that we must make use of the original materials that have been so generously supplied by Nature, work them into what is called raw materials, and in the manipulation of the latter become manufacturers, or we will lose through competition all the advantages we gain in other departments.

Foreign burlaps and machinery deprive our farmers of a considerable profit on their grain crop, and so it is in many other branches of business.

Any community that obtains its raw materials from abroad is at best but a vassal of some other section, while every addition made to its products is a link severed from the chain of dependence that binds it, however unwillingly, to a distant and perhaps an unfriendly interest.

The manufacture at home of a good quality of pig iron liberates us at once from the domination of the foreign metal markets, and makes possible the manufacture of many things of vast importance to the people of this coast. Iron plates suitable for ship-building ought to be made here. This would enable the Pacific Coast to build and own a fleet of ships that could control the coast and foreign trade in the interest of home capital and enterprise.

Then would arise a demand for skilled as well as unskilled labor, and by cheapening construction extend the area to be supplied, build up commercial trade, protect our merchants, and add another solid block to the foundation upon which our future greatness will rest.

#### THE MECHANIC AND HIS FIELD.

The next, and by far the most important factor to be considered in any estimate of our future success in the manufacturing enterprises, is the mechanic himself, for without him all these calculations are idle and useless.

The question is, Does this State furnish an inviting field in which the mechanic can work out the problem of a comfortable existence?

This has been a serious question in the presence of a constantly increasing foreign horde, rapidly monopolizing all departments of labor; but the recent ratification by both parties of a treaty between the United States and China, under which the United States is permitted to restrict this non-assimilating immigration, gives us hope to believe that this vexed question will soon be settled in favor of the Caucasian race.

Let Congress act promptly and effectively under the treaty stipulation and put a stop to this invasion. The immense number of arrivals by every steamer warn us that action cannot be had too soon, and we look to our representatives in both Houses of Congress for a determined effort in that behalf. With this question settled, the mechanics, and, in fact, all classes, will feel more contented. Agitation will necessarily cease when the cause for it is removed, and capital will return to its accustomed channels. Our young and active boys will be encouraged to learn some useful trade when they know they will not be driven from their employment by a race with whom they cannot compete on any narrow ground in a contest for existence.

#### EXCELLENCE IN WORKMANSHIP.

There does not seem to be any just reason why this State should not be the best place in the world for the mechanic, and I believe it will be so demonstrated very soon; but there must be an effort made to attain excellence in workmanship before there can be any successful competition with the manufactures of the East and Europe.

And here it is that the influence of this institute should be made aggressive and effective. The Society is to be congratulated for the splendid work it has already accomplished. Its Library of over 30,000 volumes of choice literature, including the best collection of scientific works on the coast, is a matter of just pride. The courses of lectures it has furnished to its friends and patrons have been exceedingly beneficial, and the whole State has eagerly watched the improvements, encouraged and developed by the periodical exhibitions given under its auspices. But something more should be done in the direction of education. Our young men and boys need counsel and instruction, and I am glad to know that I but reiterate the opinion of

the present officers of this Society, and their predecessors when I say, that there should be some further means employed for imparting instruction in the mechanical or technical arts.

We have arrived at a point in the development of the resources of this State where the best appliances must be used, and the most skillful workmen employed, if we expect to keep pace with the world at large.

The fruits that grew near at hand have all been gathered, and we must now reach and climb for those which are beyond our immediate grasp.

The first miners found gold near the surface, and generally separated it from the earth without the assistance of much machinery, or if any was used, it was of the most simple character. But now we find the miner, as he pursues the receding metal into the mountain, assisted by the most complicated and powerful machinery on the globe, while he himself has developed genius in the pursuit and skill in controlling and directing his mechanical agents. And so it is in nearly all departments of industry. What the State wants now is men specially trained and skilled in their respective callings. Here again we have the raw materials in abundance.

Our boys require just this training to make them safe citizens and capable of becoming a power in the great forces of the world. It is the men who labor in some legitimate industrial pursuit that furnish the muscle and the muscular brain—if I may be permitted to use the expression—to blaze pathways into the mysterious depths of nature and nature's forces.

#### EVERY BOY SHOULD LEARN A TRADE.

Says Mr. Wendell Phillips in his recent address at Harvard College : “Book learning does not make five per cent. of that mass of common sense that ‘runs’ the world, transacts its business, secures its progress, trebles its power over nature, works out in the long run a rough average justice, wears away the world’s restraints and lifts off its burdens. The ideal Yankee, who has more brains in his hand than others have in their skulls, is not a scholar—and two-thirds of the inventions that enable France to double the world’s sunshine and make Old and New England the workshops of the world did not come from colleges or from minds trained in the school of science, but

struggled up, forcing their way against giant obstacles, from the irrepressible instinct of untrained natural power. Her workshops, not her colleges, made England for awhile mistress of the world—and the hardest job her workman had was to make Oxford willing he should work his wonders."

Every boy that can, should learn a trade, whether he expects to follow it or not. Nothing is lost in learning how to work. If the aim of the boy is high, so much the better. The training will do him good.

But it has been said that there is no room here for a great many boys to learn trades, and that as many as can be accommodated are now employed. If this is true, let us hope that some plan will be devised at once to teach a trade to every boy who is willing to learn. There is always room for excellence. Well trained men can always find employment. It is the idle, the wasteful and extravagant who are always being pushed to the wall. There is generally plenty of work for those who are skilled and willing to work, and always unsolved problems for those who are able and willing to think.

"The powers of man," says Emerson, "have not been exhausted. Nothing has been done that cannot be better done. There is no effort of science or art that may not be exceeded; no depth of philosophy that cannot be deeper sounded; no flight of imagination that may not be passed by strong and soaring wings."

Let us not be afraid of having too many well trained men. No nation ever suffered from this class of population, and it is not likely we shall.

#### A NEW ELEMENT OF WEALTH AND POWER.

Mr. President and gentlemen of the Mechanics' Institute, persevere in your efforts to infuse into the atmosphere of this State a new element of existence, wealth and power! It is a great labor with which you have become identified, but it is a noble work.

As you proceed you may suffer many disappointments. This is the common course of all great developments.

"Checks and disasters,  
Grow in the veins of actions highest rear'd  
As knots, by the conflux of meeting sap  
Infect the sound pine, and divert his grain  
Tortive and errant from the course of growth."

But the ultimate result can not be doubted. The pine will continue to grow, and this State must continue to develop. Its commerce will be extended; its manufactures increased, and the productions multiplied. These will be your monuments.

#### AN AGE OF PROGRESS.

If we look abroad, we find we are in an age of wonderful activity and progress, and we are in the line of march. Take for example the improvements and discoveries in the field of electricity. We find that rapid strides have been made in the divisibility of the current, while Faure in France, and Brush in America, have solved the problem of storing electricity in convenient packages, that will contain this suppressed energy for an indefinite period, and can be transported any distance. Perhaps this invention hints, that in the near future, our house lights, done up in neat packages, will be left at our door, and the empty cans taken away to be refilled. No smoke, no smell, no dirt, and let us hope, no bill.

Judging from what we already know, we readily admit the future marvelous possibilities of electricity. Its use to-day in the city of Berlin as a motor to propel street-cars, may be the practical application of a principle that will lead to its employment in the operation of railroads, and the future Pullman express train may be a lightning express indeed, with speed and comfort as superior to our present accommodations as the latter are superior to the old stage coach.

The improvements and new uses of this mysterious power, is an illustration of what is being done in every department of force, and in every place where the welfare, comfort and happiness of mankind is the subject of thought.

Invention has summoned the nations of the earth to a grand procession in honor of her recent great discoveries. The United States occupies a prominent position in all these triumphs, and when the roll of States is called we must be ready with our banners to show what we have done and what we are doing. For the inhabitants of these States are but one people in all the elements that constitute the greatness of a nation.

We are one people in all the glories achieved in the advancement of science and arts, and in the bounteousness of productions.

We are one people in all our hopes and aspirations for the future fame of the whole country.

We are one people in a great sorrow when the head of the Nation suffers and comes near death's door at the cruel hand of an assassin.

The ties of interest and social intercourse, are not wanting in strength or tenderness between the people of different sections when the whole people of the nation stand as one man, uncovered and with bended form in the presence of a mighty grief for a stricken President and his afflicted family.

During the past month, from all the States of this Union there has arisen one prayer to the Throne of Mercy, that the God of Nations might spare our beloved President.

Perhaps in the inscrutable wisdom of Providence even this great calamity has its uses in serving to unite us all in the closer ties of a common brotherhood.

It may be that through these blinding tears we may see our way to a more perfect union, and the dream of the statesman be realized.

"When the people throughout our almost boundless domain may be seen coming together as brothers, with one love of country, and one hope of a common destiny—of safety, welfare and national glory—with one determination to achieve it by united efforts; inspired and strengthened by an equally pure and ardent patriotism; former differences forgotten and nothing remembered but their ancient concord and the equal title they have to share in the glories of the past and to labor together for the even greater glories of the future."







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